

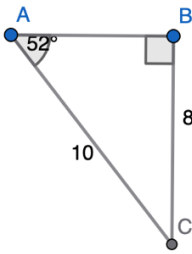
**Check Your Understanding 7.1**

Name: \_\_\_\_\_

Period: \_\_\_\_\_

Date: \_\_\_\_\_

*Show all work.*

| Basic                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Intermediate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Advanced                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <b>Trig Ratios</b><br>→ <i>Discovering the invariants</i>                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><i>Basic</i></p> <p>1.</p>  <p>(a) Write <math>\sin 52^\circ</math>, <math>\cos 52^\circ</math>, and <math>\tan 52^\circ</math> as fractions.</p> <p>(b) Name the hypotenuse, opposite, and adjacent relative to the <math>38^\circ</math> angle.</p> <p>2. Define sine, cosine, and tangent in your own words without using the terms opposite, adjacent, or hypotenuse.</p> | <p><i>Intermediate</i></p> <p>3. Two right triangles both contain a <math>62^\circ</math> angle. The first has hypotenuse 5, the second has hypotenuse 20. A student claims <math>\sin 62^\circ</math> is the same in both. Explain why, referencing similarity.</p> <p>4. In a right triangle, <math>\sin \theta = 4/5</math>.</p> <p>(a) Find <math>\cos \theta</math> and <math>\tan \theta</math> without a calculator. Draw and label the triangle.</p> <p>(b) Explain why <math>\sin \theta</math> cannot equal 1.3 for any acute angle <math>\theta</math>.</p> | <p><i>Advanced</i></p> <p>5. Explain why fixing one acute angle fixes all three trig ratios. Reference AA similarity.</p> <p>6. In the class table, what pattern holds between <math>\sin \theta</math> and <math>\cos(90^\circ - \theta)</math>? Give two examples and explain using the triangle structure.</p> <p>7. If <math>\tan \theta = 1</math>, what must <math>\theta</math> be? Explain without a calculator.</p> |
| <p><b>Algebra Spiral</b><br/><i>Simplify</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                  | <p><i>Algebra Spiral</i></p> <p>Simplify each expression completely.</p> <p>(a) <math>4x^2 + 7x - x^2 - 11x</math></p> <p>(b) <math>5(2a - 3) - 3(a - 4)</math></p> <p>(c) <math>(7y^3 - 4y + 2) - (3y^3 + y - 6)</math></p>                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Answers — CYU 7.1****Trig Ratios**

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- 1a.**  $\text{adj} = 6$ .  $\sin 52^\circ = 4/5$ ,  $\cos 52^\circ = 3/5$ ,  $\tan 52^\circ = 4/3$ .
- 1b.**  $\text{Hyp} = 10$ . Opposite to  $38^\circ = 6$ . Adjacent to  $38^\circ = 8$ .
- 2.** Accept any accurate restatement: each ratio compares two sides of a right triangle and depends only on one chosen angle.
- 3.** Both share  $62^\circ$  and  $90^\circ$ , so similar by AA. In similar triangles, opp/hyp is the same in both —  $\sin 62^\circ$  is a property of the angle alone.
- 4a.**  $\text{opp} = 4$ ,  $\text{hyp} = 5$ ,  $\text{adj} = 3$ .  $\cos \theta = 3/5$ ,  $\tan \theta = 4/3$ .
- 4b.** The hypotenuse is always the longest side, so  $\text{opp}/\text{hyp} < 1$  always.
- 5.** Any two right triangles with the same acute angle are similar by AA. Similar triangles have proportional sides, so all ratios are fixed by the angle.
- 6.**  $\sin \theta = \cos(90^\circ - \theta)$ . Ex:  $\sin 30^\circ = \cos 60^\circ = 0.5$ . The side opposite  $\theta$  is the side adjacent to  $(90^\circ - \theta)$ , so the labels swap.
- 7.**  $\tan \theta = 1 \rightarrow$  both legs equal  $\rightarrow$  isosceles right triangle  $\rightarrow \theta = 45^\circ$ .

**Algebra Spiral**

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- (a)**  $3x^2 - 4x$
- (b)**  $7a - 3$
- (c)**  $4y^3 - 5y + 8$